2012

Growth and development implications of marketing pigs at heavier weights

John F. Patience
Iowa State University, jfp@iastate.edu

A. J. Elsbernd
Iowa State University

Growth and development implications of marketing pigs at heavier weights

Abstract

In the past few decades, the American pig industry has seen a steady increase in market weights. This trend is driven by economic factors at the packing plant, where fixed costs can be allocated over more pounds of pork sold per pig, and at the farm, where sow and other fixed costs can be spread over more pounds of pork sold. Unfortunately, there is very little empirical data explaining the changes in growth rate, feed intake, energy intake and feed efficiency beyond 300 lb live weight; nor is there much data on the composition of carcasses at these heavier weights. This leads to uncertainty on the impact of further increases in market weights are adopted by our industry. Understanding the growth implications of marketing heavier hogs is important, so nutritionists, meat scientists, geneticists, producers and others involved in the production chain understand what is required to achieve optimal outcomes in terms of growth performance, carcass composition and financial returns.

Disciplines

Agriculture | Animal Sciences

Comments

This proceeding is published as Patience, J.F. and A.J. Elsbernd. 2012. Growth and development implications of marketing pigs at heavier weights. Proc. 2012 Al Leman Conference. St. Paul, MN. pp. 159-163. Posted with permission.

Growth and development implications of marketing pigs at heavier weights

J. F. Patience; A. J. Elsbernd
Iowa State University, Ames, Iowa

Introduction

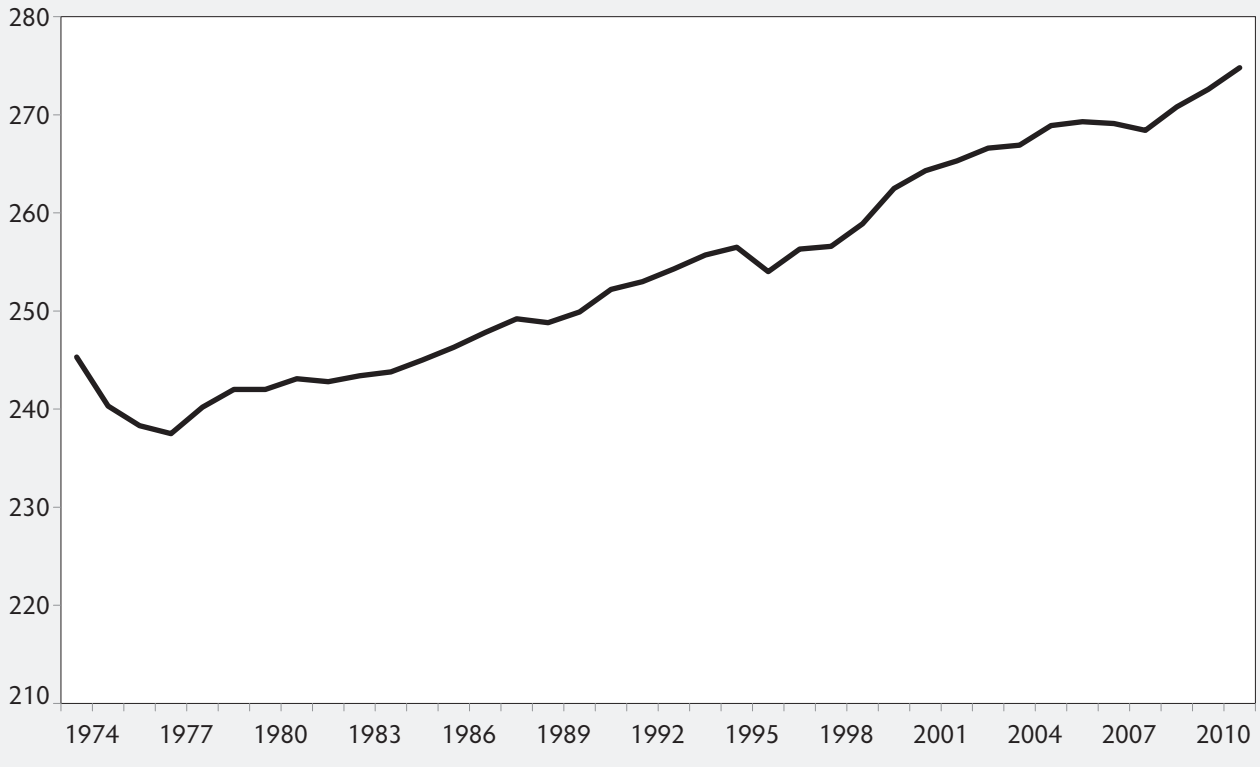
In the past few decades, the American pig industry has seen a steady increase in market weights. This trend is driven by economic factors at the packing plant, where fixed costs can be allocated over more pounds of pork sold per pig, and at the farm, where sow and other fixed costs can be spread over more pounds of pork sold. Unfortunately, there is very little empirical data explaining the changes in growth rate, feed intake, energy intake and feed efficiency beyond 300 lb live weight; nor is there much data on the composition of carcasses at these heavier weights. This leads to uncertainty on the impact of further increases in market weights are adopted by our industry. Understanding the growth implications of marketing heavier hogs is important, so nutritionists, meat scientists, geneticists, producers and others involved in the production chain understand what is required to achieve optimal outcomes in terms of growth performance, carcass composition and financial returns.

Background

Live market hog weights in the United States have been steadily increasing since 1977 (Figure 1: National Pork Board, 2012). According to Plain and Mintert (1986), this increase has averaged about 1 lb per year since 1986. In 2011, the average live market weight was 274.8 lb, resulting in an average dressed weight of 205.6 lb (National Pork Board, 2012; USDA, 2012).

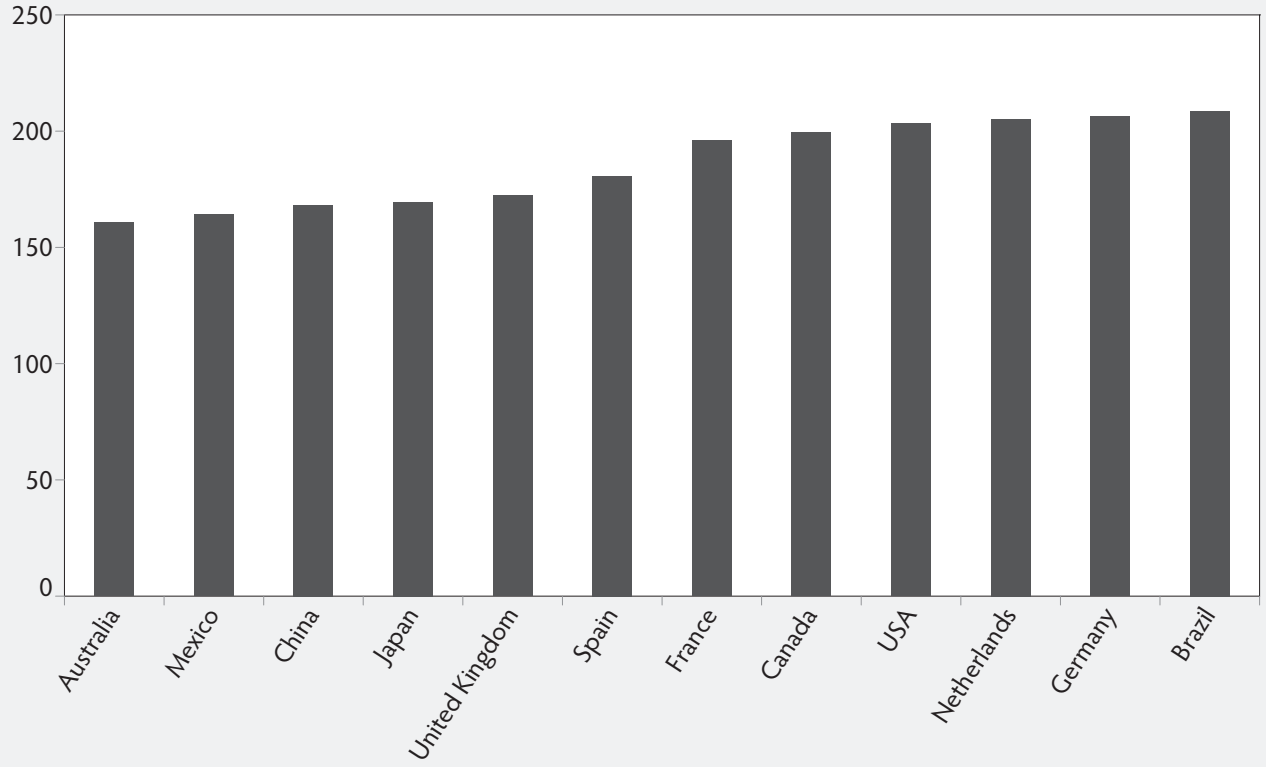
According to FAOSTAT (2012), market weights in the U.S. are greater than those in countries like Canada, France and Spain but lighter than those in The Netherlands, Germany and Brazil (Figure 2). The trend to heavier market weights appears to be limited in some cases by local market preferences, specific economic conditions and the feeding

Figure 1: Changes in market weight: 1974 to 2011



Interface

Figure 2: Average carcass weight: 2010



of intact males. When these constraints are not in place, the trend to heavier market weights is likely to continue.

Of course, achieving heavier market weights will depend on many production parameters, such as availability of additional growout space to facilitate longer growth periods, and the ability to achieve heavier weights economically. Fundamentally, the trend to heavier market weights will be influenced by the biology of growth in the pig.

Basic growth biology

The composition of gain changes as the pig grows. Shields et al. (1983) reported that the water content of the pig's body decreases from 75% at 35 lb to 43% at 320lb. The change in body water is modest above 275lb. However, these data are 29 years old, and the body composition of pigs has changed a great deal in the intervening period.

More recently, Landgraf et al. (2006) reported that the proportion of water in the empty body declined from 74.1% at 45 lb to 52.9% at 320 lb in pigs sired by Pietrain boars. During that same period, protein rose from 15.9% at 45 lb to 17.2% at 145lb and then declined back down to 15.9 % at 325lb. As expected, ash remained closely linked to protein, at about 18% of protein. Total body water will be closely linked to lean tissue in the carcass; the Pietrain offspring used in this study could tend to have a high lean content, relative to some other breeds currently in use.

Wagner et al. (1999) undertook a very detailed analysis of body composition of 5 genetic lines as they grew from 57 to 330 lb (Table 1). These data represent the whole body, minus visceral contents, and minus blood. Thus, the proportion of the body that is protein is lower than one would expect if the blood was included. Nonetheless, the protein content peaked at 95lb live weight and declined thereafter. Moisture declined as the pigs grew and lipid increased, as expected. Ash tended to decline slightly. From 280lb live weight to 320 lb, the pigs gained 5.9lb of protein, 16.8lb of water and 20.6lb of fat, i.e. the ratio of fat to protein during this period was 3.5:1.

Growth data to heavier weights

PIC (2012) completed a study of growing pigs to heavier weights (Table 2 and 3). Their data show a decline in growth rate starting after about 200 lb, but this decline accelerates after about 270lb. Feed intake increases, but not sufficiently to maintain growth rate and feed efficiency consequently declines.

Finally, it is expected that fatter pigs tend to dress higher than leaner pigs, but interestingly, dressing percent has stabilized in the U.S. since the middle of the previous decade, at about the time that market weights reached 270lb (Figure 3). In other words, weights have continued to increase but expected increases in carcass yield have not occurred.

Table 1: Change in the composition of the empty carcass as barrows and gilts grow from 57 to 330 lb live weight.

Weight, lb		Protein, %	Lipid, %	Moisture, %	Ash, %
Live	Empty body				
57.3	53.8	14.2	13.4	69.0	3.4
94.6	85.7	15.0	16.8	64.8	3.4
139.5	124.5	14.5	20.8	61.2	3.4
216.0	195.0	13.9	28.4	54.6	3.1
247.3	223.6	13.6	30.6	52.6	3.1
279.9	257.0	13.5	33.2	50.2	3.1
329.7	302.0	13.4	35.1	48.3	3.2

Adapted from Wagner et al., 1999.

Table 2: Performance of pigs growing from 10 to 28 weeks of age fed a high energy diet

Age, wks	Weight, lb	Gain, lb/d	Feed intake, lb/d	Energy intake, Mcal ME/d	Feed conversion
10	64.1				
11	76.4	1.76	3.13	4.76	1.78
12	89.4	1.86	3.57	5.44	1.92
13	103.2	1.97	3.98	6.09	2.02
14	117.5	2.04	4.36	6.70	2.13
15	132.2	2.10	4.70	7.25	2.24
16	147.2	2.14	5.00	7.74	2.33
17	162.5	2.19	5.26	8.18	2.41
18	177.8	2.19	5.48	8.55	2.51
19	193.2	2.20	5.67	8.88	2.58
20	208.5	2.19	5.83	9.16	2.67
21	223.7	2.17	5.96	9.39	2.74
22	238.7	2.14	6.07	9.59	2.83
23	253.5	2.11	6.16	9.76	2.91
24	268.0	2.07	6.24	9.91	3.01
25	282.1	2.01	6.31	10.03	3.13
26	295.9	1.97	6.36	10.14	3.23
27	309.3	1.91	6.41	10.23	3.35
28	322.3	1.86	6.45	10.30	3.47
Overall	**322.3**	**2.05**	**5.39**	**8.45**	**2.63**

Adapted from PIC, 2012

Table 3: Performance of pigs growing from 10 to 28 weeks of age fed a low energy diet

Age, wks	Weight, lb	Gain, lb/d	Feed intake, lb/d	Energy intake, Mcal ME/d	Feed conversion
10	62.0				
11	73.8	1.69	3.10	4.62	1.84
12	86.4	1.80	3.56	5.29	1.98
13	99.7	1.90	4.00	5.93	2.11
14	113.5	1.97	4.42	6.53	2.24
15	127.7	2.03	4.80	7.08	2.37
16	142.3	2.09	5.14	7.58	2.47
17	157.0	2.10	5.45	8.02	2.59
18	171.9	2.13	5.72	8.40	2.69
19	186.8	2.13	5.95	8.73	2.79
20	201.6	2.11	6.15	9.01	2.91
21	216.4	2.11	6.32	9.25	2.99
22	230.9	2.07	6.47	9.46	3.12
23	245.3	2.06	6.59	9.64	3.20
24	259.3	2.00	6.70	9.79	3.35
25	273.0	1.96	6.79	9.91	3.47
26	286.4	1.91	6.86	10.02	3.59
27	299.4	1.86	6.93	10.12	3.73
28	312.1	1.81	6.99	10.20	3.85
Overall	**312.1**	**1.98**	**5.66**	**8.31**	**2.85**

Adapted from PIC, 2012

Conclusion

There are not a lot of data available to evaluate the impact of increased market weights on pig performance and on financial outcomes. However, the data that are available provide sufficient information to allow producers to develop reasonable estimates of performance beyond 280 lb, and thus conduct crude economic analysis to determine the weight at which net returns are maximized. However, empirical data that are farm specific are necessary to complete a sufficiently precise economic analysis to make marketing decisions.

References

1. FAOSTAT. 2012. Accessed July 21, 2012. http://faostat3.fao.org/home/index.html#COMPARE

2. Landgraf, S., A. Susenbeth, P.W. Knap, H. Looft, G.S. Plastow, E. Kalm, and R. Roehe. 2006. Developments of carcass cuts, organs, body tissues and chemical body composition during growth of pigs. Animal Science. 82: 889–899.

3. Martin, A.H., A. P. Sather, H.T. Fredeen, and R. W. Jolly. 1980. Alternative market weights for swine. II. Carcass composition and meat quality. J. Anim. Sci. 50:699–705.

4. National Pork Board. 2012. Quick Facts: Productivity measures of the U.S. pork industry. Accessed July 21, 2012. http://viewer.zmags.com/publication/5bbbaab6d#/5bbbaab6d/94.

5. PIC. 2012. Growth curves for PIC337RG sired pipgs fed high and low energy diets. Technical Memo 344. Henderonville, TN. 17 pp.

6. Plain, R. and J. Mintert. 2010. Marketing slaughter hogs: where, how and when. Iowa State University Extension and Outreach. PIH-12.

7. Shields, Jr., R.G., D. C. Mahan and F. M. Byers. 1983. Efficacy of deuterium oxide to estimate body water composition of growing swine. J. Anim. Sci. 57:66–73.

8. USDA. 2012. National Agriculture Statistics Service. Accessed July 21, 2012. http://quickstats.nass.usda.gov/

9. Wagner, J.R., A.P. Schinckel, W. Chen, J.C. Forrest, and B.L. Coe. 1999. Analysis of body composition changes of swine during growth and development. J. Anim. Sci. 77:1442–1466.

Figure 3: Dressing percent